

Memorandum

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DIVISION OF ENGINEERING SERVICES
OFFICE OF BRIDGE DESIGN SOUTH – MS-9
BRIDGE DESIGN BRANCH 14

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EA: 11-2326U1
Los Penasquitos
Creek Bridge (Widening)
Bridge No. 57-0106L/R

Attention: Mr. John J. Lane

From: DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES - MS 5
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Subject: Preliminary Pile Tip Elevations

The purpose of this technical memorandum is to provide preliminary pile tip elevations for the CIDH piles that are planned to support the widening structures that will accommodate additional traffic lanes at the Los Penasquitos Bridge (Bridge No. 57-0106L/R) on Route 15 in San Diego County. The width of the added bridge sections will vary from 11.2 to 13.9 m for the left bridge (Southbound) and up to 3.8 m for the right bridge (Northbound). The widening structures are planned to be supported on 2.44-m-diameter (8-ft diameter) CIDH piles. This memorandum includes estimated elevations of the existing ground surface and top of bedrock at the planned support locations and supersedes a previous memorandum dated March 14, 2003.

Subsurface conditions at the site were evaluated on the basis of information contained in the existing As-Built Log of Test Borings (LOTB). No subsurface investigation for the current project has been performed to date. Three subsurface site investigations were conducted for the design and construction of the existing left and right bridges and their subsequent widenings. The site was first explored in November 1962 for the construction of the left bridge. In October 1972 a second investigation was conducted for the first widening of the left bridge. The third investigation was performed also in October 1972 for the design of the existing right bridge.

The bridge spans over a small canyon with relatively steep sides and flat bottom occupied by the Los Penasquitos Creek. The information contained in the LOTBs indicates that the sides of the canyon are covered by fill material placed to create the approach embankments at both abutments. Colluvium deposits are also present at the ground surface or underlying the fill. At Abutment 1 approximately 15 to 18 m of fill were

placed. Because of the relatively steep slopes of the original canyon walls, fill placement extended near the bottom of the canyon to create a stable fill slope. Between 10 to 14 m of fill were placed at Abutment 6.

The fill material consists of medium dense to dense sand and gravel with some clay and numerous rock fragments. It is our understanding that considerable settlement of the fill material at the abutments was observed during construction of the existing structures. Because the fill material was placed over existing colluvium or bedrock, it is believed that the cause of the settlement was due to consolidation of the fill material under its own weight and not due to compression of the underlying material.

The colluvium material is composed primarily of dense gravelly sand with cobbles and some boulders. Bedrock is present underlying the colluvium. The bedrock consists of highly fractured and decomposed granitic rock. Penetration resistance in the rock, measured by the Standard Penetration Test (SPT) during drilling, is in the range of 60 to more than 100 blows per 0.3 m (blows per foot), with the lower penetration resistances generally occurring in the upper 3 to 4 m below the top of bedrock. Groundwater was encountered at Elevation 89.5 m near the creek at the time of drilling, but considering that the canyon is a natural watercourse, variations in groundwater elevation are expected.

Pile tip elevations were estimated on the basis of the information contained in the As-Built LOTBs. Nominal resistance values for axial compression were provided by your office on January 28, 2003 and are indicated in Table 1. Considering the magnitude of the Nominal Resistance for the left bridge of more than 26,800 kN, we are providing herein recommended pile tip elevations for CIDH pile diameters of 2.44 m (8 ft), 3.05 m (10 ft) and 3.66 m (12 ft).

Table 1 Preliminary Pile Tip Elevations (m)							
Bridge	Bent	Est. Ground Surface Elevation (m)	Est. Top of Bedrock Elevation (m)	Nominal Resistance (kN)	Pile Diameter		
					2.44 m	3.05 m	3.66 m
Left	2	111.3	98.5	26,884	89.0	92.1	94.2
	3	93.6	86.0	26,884	70.1	73.5	75.6
	4	93.6	89.0	26,884	72.6	75.6	78.0
	5	109.8	105.2	26,884	90.5	93.3	95.4
Right							
	2	109.8	105.2	14,745	97.6	99.4	-
	3	96.3	89.9	14,745	82.9	84.8	-
	4	90.9	85.4	14,745	76.5	78.4	-
	5	100.0	87.8	14,745	82.3	83.8	-
	6	105.2	96.0	14,745	85.4	86.9	-

We understand that all of the abutments will be constructed on compacted structural fill and that up to 5 m of fill may be required at some locations. We recommend that the abutments be supported on shallow spread-type foundations designed for an allowable contact pressure of 191.5 kPa. All footings should have a minimum width of 3.6 m. It is recommended that prior to structural fill placement, any existing fill material located within 3 m of the proposed abutments be removed and replaced with compacted structural fill. In addition, we recommend that native material be overexcavated to a depth of 0.6 m or where suitable material is encountered, whichever is deeper, prior to structural fill placement.

The structural fill should be placed to a relative compaction of not less than 95 percent compaction following the ASTM D-1557 Standard. Placement of structural fill should follow Caltrans Standard Specifications 19-3, 19-5 and 19-6. End dumping of fill material should not be allowed.

Installation of the CIDH piles will require soil and rock excavation techniques. Drilling through soil may require casing to prevent caving and sloughing. Hard drilling may be encountered while advancing the drilled shafts through bedrock. Fractures and discontinuities in the bedrock with adverse orientation relative to the side of the drilled shafts may cause instability of the sidewalls and cause sloughing and caving. Therefore, the contractor should also be prepared to use temporary casing or any other means to stabilize the sidewalls of the open drilled shafts while drilling through bedrock.

As indicated above, no subsurface site investigation has been conducted at the bridge site for the current project. Moreover, the information contained in the As-Built LOTBs is insufficient to properly characterize the subsurface materials, especially the decomposed and weathered granitic bedrock. Therefore, the pile tip elevations provided herein should be considered preliminary.


It is our understanding that the geotechnical site investigation will be conducted as a first order of work during construction. Considering the magnitude of the axial loads transmitted to the foundations, we recommend that one boring be conducted at each of the proposed bent locations. The borings should extend to a depth about 6 m below the preliminary tip elevations.

Mr. Majid Madani
March 20, 2003
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Los Penasquitos Creek Bridge
Bridge No. 57-0106 L/R

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Attachments

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